

REMARKS

Claims 60-143 are all the claims pending in the application. The Examiner withdrew claims 60-89 and 116-143 as being directed to a non-elected invention. Accordingly, Applicant cancels the withdrawn claims without prejudice or disclaimer.

The Examiner examined claims 90-115. By this Amendment, Applicant amends claim 90 to include the unique features of claim 91, claim 95 to further clarify the features set forth therein, and claims 104 and 112 to cure a minor informality noted by the Examiner and claims 92-94 for consistency therewith. Accordingly, claim 91 is cancelled without prejudice or disclaimer. Claims 144-147 are herein added and are clearly supported throughout the specification.

I. Preliminary Matters

As preliminary matters, Applicant thanks the Examiner for initialing the references listed on Forms PTO/SB/08 A & B (modified) submitted with the Information Disclosure Statements filed on July 13, 2009, March 27, 2009, September 5, 2006, and November 29, 2005.

Applicant also thanks the Examiner for acknowledging the claim to foreign priority and for confirming that the certified copy of the priority documents was received.

Applicant respectfully requests the Examiner to indicate acceptance of the drawings.

II. Improper Restriction Requirement

Applicant respectfully maintains that this restriction requirement regarding composition materials of the electrode is premature. *None of the claims recite a specific material of the electrodes.* Accordingly, all claims are generic.

As noted previously, the criteria for election should be based on presentation of CLAIMS directed to more than one species. However, none of the elected claims recite or are limited to any of the *specific* materials listed in Table 1 and Table 2 of the present Application, where the Examiner has requested the Applicant to elect a single material from one of the tables. The claimed invention is applicable to a wide variety of materials. Thus, this election of species requirement is arbitrary at this time.

Furthermore, since the search of the existing claims is not limited to any specific material elected by the Applicant and since the independent claims are not so narrowed, there is no extra search burden on the Examiner. Thus, a full search is necessary regardless of Applicant's election. Since Applicant's election at this time does not impact the search field, there is no burden on the Examiner. Accordingly, the Examiner's assertion that a search and examination burden exists is deemed premature and without merit *at this time in prosecution*.

III. Summary of the Office Action

Claims 90-115 are rejected under 35 U.S.C. § 112, second paragraph. Claims 90 and 95 are rejected under 35 U.S.C. § 102(b) and claims 91-94 and 96-115 are rejected under 35 U.S.C. § 103(a). Claims 90-115 are also rejected on the ground of nonstatutory obviousness-type double patenting rejection.

IV. Claim Rejections under 35 U.S.C. § 112, second paragraph

Claim 90-115 are rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which the applicant regards as the invention.

Specifically, the Examiner alleges that the term “uniform” in claims 90, 95, 100, and 108 is indefinite. Applicant respectfully thanks the Examiner for pointing out, with particularity, the aspects of the claims thought to be indefinite. Applicant respectfully requests the Examiner to withdraw this rejection in view of the self-explanatory claim amendments being made herein.

In addition, the Examiner rejected claims 104 and 112 under 35 U.S.C. § 112, second paragraph, for a minor informality. Applicant respectfully thanks the Examiner for pointing out, with particularity, the aspects of these claims thought to be indefinite. Applicant respectfully requests the Examiner to withdraw this rejection in view of the self-explanatory claim amendments being made herein.

V. Prior Art Rejections

Claims 90 and 95 are rejected under 35 U.S.C. 102(b) as being anticipated by Saito (JP 05-148615), hereinafter “Saito” and claims 91-99 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Saito in view of Imai et al. (JP 11-229159), hereinafter “Imai”.
Applicant respectfully traverses these grounds of rejection at least in view of the following exemplary comments.

Independent claim 90 recites forming the film using an electrode obtained by compression-molding powder with an average value of particle diameters not less than 10 nanometers and not more than 1 micrometers by using electrode material that is capable of forming a thick film with thickness not less than 100 micrometers.

The Examiner contends that ¶ 27 of Saito discloses the metallic powder as set forth in claim 90 (*see page 5 of the Office Action*). Applicant respectfully disagrees.

Saito discloses that the electrode may include various metallic materials or nonmetal materials, for example, they are metal or an alloy, a nonmetallic element, ceramics, carbide, a nitride, boride, etc. concrete -- as hard material -- nitrides (fine ceramics), such as borides, such as carbide, such as WC, TiC, TaC, ZrC, and SiC, TiB₂, and ZrB₂, TiN, and ZrN, etc. -- a simple substance -- or where a sintering aid is added, it can cover. Corrosion-resisting materials, such as metallic materials, such as W and Mo, aluminum, Ti, nickel, Cr, and Co, can also be used. In Saito, the material may be mixed with conductive materials, such as iron powder, cobalt powder, nickel powder, chromium powder, and copper powder. The material is chosen due to the surface characteristic (¶ 16).

Saito, however, does not disclose or suggest the electrode is a green compact electrode and is formed with a powder having an average grain diameter of 1 micrometer or less. Saito only discloses that the cover material, e.g., the WC powder (mean particle diameter of 3 micrometers), is mixed with Fe powder (mean particle diameter of 9.8 micrometers), to form the green compact (¶ 27). That is, Saito only discloses the cover material having mean particle diameter of 3 micrometers. In other words, Saito only discloses diameter of the particles in the cover and does not disclose or even remotely suggest the diameter of the powder being 1 micrometer or less. In addition, Saito clearly does not disclose or even remotely suggest the diameter of the powder being not less than 10 nanometers. That is, Saito clearly does not disclose or suggest the lower boundary for the diameter of the powder.

The Examiner further alleges that Imai cures the above-identified deficiencies of Saito by disclosing that the diameter of the metallic powder or the metallic compound powder is a result-effective variable (*see* pages 6-7 of the Office Action). Applicants respectfully disagree.

Imai describes that the requested specifications such as the hardness, the wear resistance, the film thickness and the surface roughness of a surface treated layer to be formed on a work are stored in a requested specification storage part 3, and the characteristics on the discharge of a powder electrode, for example, the composition of the electrode material, the electrode length and the electrode area are stored in an electrode characteristic storage part 2. The discharge treatment condition such as the polarity of the discharge pulse, the peak current, the open voltage, the pulse-ON time, the pulse-OFF time or the servo voltage suitable for the discharge treatment are set by a discharge treatment condition control part 4 using information in the storage parts 2 and 3 (*see* Abstract). With respect to the diameter parameters, Imai discloses that what is necessary is just to determine the optimal electrodisscharge treatment energy from a point of thickness if electrodisscharge treatment energy is chosen from a planar point from E1-E2 when particle diameter is 5 micrometers. On the other hand, with the electrodisscharge treatment energy used when particle diameter was 5 micrometers, when particle diameter is 1 micrometer, since the shape of planarity of that to which thickness becomes thick gets worse, the electrodisscharge treatment energy can form a good film by choosing out of E0-E1 (¶ 20).

In other words, Imai discloses that when the diameter is 1 micrometer, the surface properties are deteriorated. As such, Imai teaches away from having the particle diameter being 1 micrometer or less because it discloses that the surface properties will be deteriorated.

Furthermore, Imai discloses different particle diameters of the electrode and not of the powders. Imai does not disclose or even remotely suggests the powder having the particle diameter of 1 micrometer or less. Also, Imai does not disclose or suggest the lower boundary being not less than 10 nanometers. In Imai, such low boundary would not result in an acceptable electrode at least because the surface properties deteriorate already at 1 micrometer.

Furthermore, the diameter of the metallic powder is not a result-effective variable but one of the unique features of the present invention. MPEP § 2144.05 recites:

A particular parameter must first be recognized as a result-effective variable, i.e., a variable which achieves a recognized result, before the determination of the optimum or workable ranges of said variable might be characterized as routine experimentation. *In re Antonie*, 559 F.2d 618, 195 USPQ 6 (CCPA 1977) (The claimed wastewater treatment device had a tank volume to contractor area of 0.12 gal./sq. ft. The prior art did not recognize that treatment capacity is a function of the tank volume to contractor ratio, and therefore the parameter optimized was not recognized in the art to be a result- effective variable.). See also *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980) (prior art suggested proportional balancing to achieve desired results in the formation of an alloy).

In the present case, an exemplary embodiment of the present invention describes that when a predetermined powder that has a grain diameter of about 1 micrometer was molded into a green compact, an electrode with uniform hardness is obtained. In short, Applicants respectfully submit that the metallic powder having a grain diameter of about 1 micrometer is a unique

feature of the claimed invention that provides a uniform electrode and is not a result-effective variable.

For at least these exemplary reasons, claim 90 is patentably distinguishable (and is patentable over) Saito (in view of Imai). Accordingly, Applicant respectfully requests the Examiner to withdraw this rejection of claim 90 and its dependent claims 92-94.

Next, independent claim 95 recite features similar to, although not necessarily coextensive with, the features argued above with respect to claim 90. Therefore, arguments presented with respect to claim 90 are respectfully submitted to apply with equal force here. For at least substantially analogous exemplary reasons, therefore, independent claim 95 is patentably distinguishable from (and is patentable over) Saito (in view of Imai). Claims 96-99 are patentable at least by virtue of their dependency.

Claims 100, 102-108, and 110-115 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Saito. Applicant respectfully traverses these grounds of rejection at least in view of the following exemplary comments.

Of these rejected claims, only claims 100 and 108 are independent. Independent claims 100 and 108 recite *inter alia* and in some variation: forming the film by using an electrode obtained by mixing a small-diameter powder having a distribution of small particle diameters and a large-diameter powder having an average particle diameter twice or more as large as the small-diameter powder and compression-molding the powders, the large-diameter powder being in 5 to 60 volume percent, and by using electrode material that is capable of forming a thick film with thickness not less than 100 micrometers.

The Examiner acknowledges that Saito does not disclose the volume percent but alleges that the volume percent can be obtained by routine experimentation (*see* pages 8-9 of the Office Action). Applicant respectfully disagrees.

However, “[a] particular parameter must first be recognized as a result-effective variable . . . before the determination of the optimum or workable ranges of said variable might be characterized as routine experimentation.” MPEP § 2144.05(b). The grounds of rejection, however, do not address this threshold inquiry at all. The grounds of rejection further disregard that only generally, differences in concentration or temperature will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such concentration or temperature is critical.

In the present case, however, in an exemplary embodiment, it is described that when a ratio of the large-diameter powder 111 is too small, expansion of the electrode is not eliminated. However, when the large-diameter powder 111 with a volume percent of about 5% was mixed, large expansion of the electrode was eliminated. However, when the large-diameter powder 111 is increased, under the condition that energy of a discharge pulse is small, it is difficult to form a film. When a discharge pulse with large energy is used, surface roughness of a film is increased. Therefore, it is desirable to set a ratio of the large-diameter powder 111 as small as possible. When the large-diameter powder 111 had a small volume not more than 20%, a discharge pulse width was short and a dense film could be formed under a condition that a peak current value is low (pages 51 and 52 of the specification).

Furthermore, in an exemplary embodiment, concerning density of a film, when a volume percent of the large-diameter powder is larger than about 60%, density is deteriorated and the film has many spaces. In particular, when treatment is performed under a pulse condition with large energy, spaces increase in the film even if a ratio of large-diameter powder is reduced. However, when treatment is performed under a pulse condition with small energy, spaces in the film decrease and it is possible to form a dense film if the ratio of large-diameter powder is smaller than about 60%. That is, when the ratio of large-diameter powder is not more than 20%, spaces in the film are extremely small in number (Figs. 15 and 16; pages 54-56 of the specification).

It will be appreciated that the foregoing remarks relate to the invention in a general sense, the remarks are not necessarily limitative of any claims and are intended only to help the Examiner better understand the distinguishing aspects of the claim mentioned above.

In other words, Applicant respectfully submits that volume percent is a critical element and one of the unique features of the claimed invention.

Accordingly, forming the film by using an electrode obtained by mixing a small-diameter powder having a distribution of small particle diameters and a large-diameter powder having an average particle diameter twice or more as large as the small-diameter powder and compression-molding the powders, the large-diameter powder being in 5 to 60 volume percent, and by using electrode material that is capable of forming a thick film with thickness not less than 100 micrometers, as set forth in claims 100 and 108 is not suggested by Saito and is not an optimum range obtained through routine experimentation. For at least these exemplary reasons, Applicant

respectfully requests the Examiner to withdraw this rejection of claims 100 and 108 and their dependent claims 102-107 and 110-115.

In addition, dependent claim 103 recites: “the large-diameter powder has a substantially spherical shape.” For example, in a sixth exemplary embodiment, it is described that it is possible to form a dense electrode when it is molded from a spherical powder as opposed to other shapes. Accordingly, it is clearly not a matter of design choice but one of the unique features of the claimed invention.

Dependent claim 104 recites: “the small-diameter particle and the large-diameter particle have an identical component.” The Examiner acknowledges that Saito does not disclose or suggest the above-noted unique features of claim 104. The Examiner, however, alleges that it would have been obvious to use identical components because Saito describes using various materials for forming an electrode (*see pages 9-10 of the Office Action*). Applicant respectfully disagrees. Applicant respectfully notes that although Saito describes mixing various different materials, there is no disclosure or even remote suggestion of mixing the same material that has different particle diameter. For at least these additional exemplary reasons, claim 104 is patentable over Saito.

Claims 101 and 109 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Saito in view of Imai and European Patent No. 1,035,231 to Koizumi et al. (hereinafter “Koizumi”). Applicant respectfully traverses these grounds of rejection at least in view of the following exemplary comments.

Claim 101 and 109 depend on claims 100 and 108, respectively. Applicant has already demonstrated that Saito does not meet all the requirements of independent claims 100 and 108. Koizumi is relied upon only for its alleged disclosure of grinding powders (*see* page 13 of the Office Action) and as such fails to cure the deficient disclosures of Saito. Together, the combined teachings of these references would not have (and could not have) led the artisan of ordinary skill to have achieved the subject matter of claims 101 and 109. Since claims 101 and 109 depend on claims 100 and 108, respectively, they are patentable at least by virtue of their dependency.

VI. Double Patenting Rejections

Claims 90-99 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-7 of U.S. Patent 7,641,945. Applicant respectfully disagrees. Applicant respectfully notes that this rejection is based on a mere speculation and claims 1-7 do not claim “compression-molding powder,” “average value of particle diameter not less than 10 nanometers,” and “forming a thick film with thickness not less than 100 micrometers”. Since type of electrode, lower boundary of the particle diameter, and thickness of the coat is not claimed in the ‘945 patent, independent claims 90 and 95 are clearly not obvious over this ‘945 patent. Claims 92-94 and 96-99 are not obvious by virtue of their dependency. Accordingly, Applicant respectfully requests the Examiner to withdraw this rejection of claims 90-99.

Claims 90, 95, 100, 102-106, 108 and 110-114 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 46, 51 and

52 of copending Application No. 10/516,506 (hereinafter ‘506) in view of Saito. Claims 100, 102-108 and 110-115 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-7 of U.S. Patent No. 7,641,945 in view of Saito, claims 101 and 109 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-7 of U.S. Patent No. 7,641,945 in view of Saito and Koizumi, and claims 90, 95, 100, 102-106, 108 and 110-114 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 76-78, 105 and 106 of copending Application No. 10/559,427 (hereinafter ‘427) in view of Saito. Claims 91-94 and 96-99 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 76-78, 105 and 106 of copending Application No. 10/559,427 (hereinafter ‘427) in view of Saito and Imai. Claims 91-94 and 96-99 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 46, 51 and 52 of copending Application No. 10/516,506 (hereinafter ‘506) in view of Saito and further in view of Imai. Claims 101 and 109 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 46, 51 and 52 of copending Application No. 10/516,506, (hereinafter ‘506) in view of Saito and Koizumi. Applicant respectfully traverses these grounds of rejections at least in view of the following comments.

Applicant respectfully notes that ‘506 application issued as a patent and is Patent No. 7,537,808 (hereinafter ‘808).

Applicant respectfully submits that as argued above with respect to the prior art rejections, Saito, Imai, and Koizumi do not describe the above-quoted unique features of at least claims 90, 95, 100, and 108. As such, these references do not cure the deficiencies of '945 patent, '427 application, and '808 patent. Accordingly, Applicant respectfully requests the Examiner to withdraw these double patenting rejections.

VII. New Claims

In order to provide more varied protection, Applicant adds claims 114-117, which are patentable by virtue of their dependency and for additional features set forth therein.

VIII. Conclusion

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly invited to contact the undersigned attorney at the telephone number listed below.

AMENDMENT UNDER 37 C.F.R. § 1.111
U.S. Appln. No.: 10/558,384

Attorney Docket No.: Q91743

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Date: **July 1, 2010**